ARNICA MOLLIS AND A. LANCEOLATA

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BEING asked why, in the 8th edition of Gray's Manual (1950), I do not maintain the eastern *Arnica lanceolata* Nutt. as distinct from the cordilleran *A. mollis* Hook., I am presenting a somewhat detailed reply.

Although most students of the group have found no fundamental specific characters to distinguish the more common *Arnica* of eastern Canada, northern New England and northeastern New York from the cordilleran *A. mollis* Hook., Dr. Bassett Maguire in his *Monograph of the Genus Arnica* in Brittonia, iv. no. 3 (1943), especially on pp. 471, 474 and 475 and 477–481, keeps them apart as wholly satisfactory species. This is the more striking since he sees only subspecies, varieties, races, etc., in other localized plants of Newfoundland and the Gaspé region which have far more stability than does *A. lanceolata* Nutt., reputedly strictly eastern representative of the supposedly strictly western *A. mollis*. At two different times in the past I have published my conclusion, based on a stack of herbarium-sheets which closely crowd two standard pigeon-holes; but, in view of the seeming conclusiveness of Maguire's treatment, we find eastern botanists calling the plant of Quebec, New Brunswick and New England *A. lanceolata*. To this group I do not belong.

In Maguire's key (his p. 471) we get the two elements separated as follows:

A. Cauline leaves 4–10 pairs (rarely only 3, and then the periclinium not long-stipitate-glandular), coarsely serrate, or serrate-dentate.
  B. Periclinium long-stipitate-glandular
    C. Cauline leaves 5–10 pairs (rarely only 3–4); heads 5–9 (rarely 1–3); plants of western North America..23. *A. amplexicaulis.*
    C. Cauline leaves 4 or only 3 pairs (rarely 5); heads 1–3 (rarely 5); plants of northeastern North America....25. *A. lanceolata.*

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A. Cauline leaves 3 pairs (rarely 4), denticulate, seldom serrate; periclinium long-stipitate-glandular.
  B. Heads radiate.
    C. Immature heads erect, lower portion of stem and leaves not lanate-pilose; pappus tawny, mostly plumose, the setae 0.3 (0.24)–0.45 (0.6) mm. long.....26. *A. mollis.*

Noting that the last "C" is in contrast with *Arnica Parryi*, not with no. 24, *A. lanceolata*, we are left, as the key-differences between the "northeastern" *A. lanceolata* and the western *A. mollis:*

Cauline leaves 4 or only 3 pairs (rarely 5) and if only 3, then the periclinium not long-stipitate-glandular, the leaves coarsely serrate of serrate-dentate; heads 1–3 (rarely 5)....*A. lanceolata.*
Cauline leaves 3 pairs (rarely 4), denticulate, seldom serrate; periclinium long-stipitate-glandular.....*A. mollis.*

Now Nuttall's original description of *A. lanceolata* said "stem leaves about three pairs, semiamplexicaule." In a subcespitose or closely tufted plant it is difficult to say just what have been counted as cauline leaves, for very often the definitely petioled leaves extend well up the stem, while in the minor *A. mollis*, var. *petiolaris* Fern. of relatively low altitudes in New England and eastern Canada, nearly all the cauline leaves taper at base to petioles; 2 or 3 pairs of cauline leaves are the rule in the eastern plant; 1, 4 or 5 very exceptional. Surely, however, the individuals with 3 pairs have just as many stipitate glands on the involucre as do the others. The character "heads 1–3 (rarely 5)" would give a more accurate picture of the eastern plant if the parenthetical phrase read (rarely –9). The great majority of flowering stems of the eastern plant have 1 or 3 heads, those in the Gray Herbarium giving the following percentages: 1 head, 37%; 2 heads, 12%; 3 heads, 43%; with 4, 5, 6, 7, 8 and 9 making up meagre portions of the remaining 8%. In the fuller account, p. 477, the number of heads of the western *A. mollis* is given as "1–3 (5)", exactly as for the eastern *A. lanceolata;* and, although from the key one gathers that plants of *A. lanceolata* with pairs of cauline leaves "only 3 [a common number]" have "the periclinium not long-stipitate-glandular", the full description (p. 475) clearly says of it "periclinium obviously long-stipitate-glandular." Thus one becomes quite perplexed and resorts to leaf-outline, toothing and other characters. Any variation of leaf-outline and toothing in the leaves of *A. mollis* can be promptly matched by those of *A. lanceolata;* so can the involucres, both in shape and size, and the achenes.

After a third study of the two isolated branches of *Arnica mollis*, I find myself as incapable as heretofore of seeing two species in it.

In its segregation into two areas, one in western, the other in eastern North America (especially in southeastern Canada or the adjacent northeastern United States) it becomes a member of a very large group of species with similarly disrupted range. They were long ago isolated by the development of the arid Great Plains, the aridity and the increased alkalinity of the standing waters evidently excluding many of the terrestrial and most of the aquatic species of the two relict areas. In view of his well known tendency to "split" whenever possible, it is significant that Rydberg treated as identical such western and eastern groups of many bicentric species: for instance, *Potamogeton Robbinsii*, *P. obtusifolius*, *P. amplifolius*, *P. epihydrus*, *Najas flexilis*, *Scirpus subterminalis*, *S. heterochaetus*, *Habenaria unalascensis* (*Piperia*), *Goodyera oblongifolia* (*G. decipiens*), *Corallorhiza striata*, *Arenaria macrophylla* (*Moehringia*), *Cerastium beeringianum*, *Parnassia Kotzebuei*, *Dryas Drummondii*, *Oxytropis foliolosa*, *Hedysarum Mackenzii*, *Osmorhiza obtusa*, *Vaccinium ovalifolium*, *Lonicera involucrata*, etc., etc. These and *Arnica mollis* belong in the same geographically disrupted group.

But how different would seem to have been Rydberg's work on *Arnica!* Of 43 species of *Arnica* described or named by him 42 are reduced to outright synonymy by Maguire. Of the value of such wholesale reduction I am not in a position to judge. Both of these authors maintained as distinct species *A. mollis* and *A. lanceolata*. I am, after repeated attempts, unable to follow either of them in this specific separation; and so many points in Maguire's extended monograph show inattention to details, that one naturally wonders about the finality of the work.

On his p. 494, he published, as fig. 21, a map said to show "World distribution of the genus *Arnica*." In North America his southern boundary for the genus extends across Lake Winnipeg, thence slightly south of Hudson Bay, thence northward into the northern half of the Labrador Peninsula, and finally with a continuous tongue running southwestward from the eastern half of the Labrador Peninsula and easternmost Newfoundland without a break to Florida, thus including all central, eastern and southern Newfoundland, the Magdalen Islands, Prince Edward Island, southern New Brunswick, Nova Scotia, southern Maine, southern New Hampshire, southern Vermont, Massachusetts,

Rhode Island, Connecticut, Long Island and southern New York, New Jersey and much other terrain where no *Arnica* is known. On the other hand, the exclusion of any *Arnica* from the region of Lake Superior (map 21) is not easily reconciled with his map 6 (on p. 429), where his *A. lonchophylla*, ssp. *arnoglossa* is shown from just north of Lake Superior. Map 6 also shows *A. lonchophylla*, ssp. *chionopappa*, i. e. *A. chionopappa* Fern., with many stations in the waters of the Gulf of St. Lawrence, along the eastern half of the North Peninsula of Newfoundland, whence it is unknown; while the single New Brunswick station, calcareous ledges at Sisson Gorge on the Tobique River, emptying into the St. John in northwestern New Brunswick, is mapped as being in the noncalcareous eastern section, near the mouth of the Mirimichi which empties into the Gulf of St. Lawrence. Again, the endemic *A. Whitneyi* Fern. (appearing as *A. cordifolia*, ssp. *Whitneyi* (Fern.) Maguire), is correctly stated on p. 452 to be known only from Keweenaw County, Michigan, but on the map (fig. 10) it seems to be recorded from other counties and even to occur south of the Straits of Mackinac. Be that as it may, the gap of 250 miles north of Keweenaw Peninsula, on map 21, before reaching the southern limit of the genus in that longitude, is not supported by the facts which the author himself definitely stated.

Turning to Europe, the same disregard of readily available data is unfortunately evident. Map 21 shows all of Sweden supporting the genus, but the southwestern half of Norway lacking it, although reference to Hartman, Skand. Fl. 8 (1879) would have shown that *Arnica montana* in Norway extends northward to Trondhjem. The detailed map of Hultén's Atlas (1950) shows this southern Norwegian area, but no *Arnica* in Sweden except in the southern half of that country. Southeastward in Europe Maguire's map shows a tongue extending only to the Pyrenees. Had he consulted such an old standard as Nyman's Conspectus he would have found Spain and Portugal both entered for *A. montana*. Consultation of the Compend. Fl. Española of Lázaro e Ibiza, ed. 3 (1920) would have shown not only two characteristic illustrations of the plant, but the statement that it occurs on the mountains across northern Spain ("Montañas elevatas del NE., N. y O."). Similarly Pereira

Coutinho's Flora de Portugal (1913) would have given full confirmation of its occurrence in Portugal. Singularly enough (and somewhat sadly), Maguire's map 19 (p. 487) of the range of *A. montana* has a single dot for the Cantabrian Mts. of northern Spain, but even that did not get on the ostensibly complete map (21) of the full range of the genus.

All this digression from *Arnica mollis* may seem superfluous, but when an author so far departs from the conceptions and conclusions of others as does the author of the extended treatment of *Arnica*, it becomes important to check his accuracy in other details. It seems evident that a reconsideration of the genus and its distribution may become desirable. That Maguire now sees that some of his statements have been misleading is clear from his article which immediately precedes this discussion.

EXTENSION OF SOLIDAGO ERECTA.—When a species new to Quincy, Massachusetts, an area well explored by the earlier botanists, is found, it seems worthy of a brief note.

While collecting desmids in the little pools of the old Quincy quarries, what at first I took to be *Solidago caesia* L. attracted my attention because the upper leaves were reduced, contrary to the usual way in that species. As I was getting desmids, not flowering plants on that trip, I merely grabbed one specimen. Being wholly unfamiliar with *Solidago erecta* Pursh, it was not until I had reached home that I discovered I had found this species and not *Solidago caesia*.

Mr. F. W. Hunnewell kindly confirmed my recollection that it had not previously been found north of Cape Cod, Massachusetts. The one (alas!) specimen has been deposited in the herbarium of the New England Botanical Club. Perhaps further exploration will uncover stations for this southern species to fill in the gap between Cape Cod and Quincy.—FRANK C. SEYMOUR, Tomahawk, Wis.